

Remarks

Claims 4, and 6-10 are currently pending in the application. In the Final Office Action mailed June 7, 2010, claims 4, and 6-10 are rejected.

In the instant Amendment, claims 4 and 6 have been amended to make the claim language clearer. In particular, claim 6 has been amended to remove the term “galvanized layer”. Since the method of production of a hot dip galvanized composite high strength steel sheet as set forth in claim 4 is produced from the combined process of galvanizing and annealing, it is more appropriate to recite that the steel sheet is characterized by further treating a galvannealed layer by one or more of a chromate treatment, inorganic coating film treatment, chemical conversion, or resin coating film treatment. Accordingly, no new matter is added.

The amendment is proper in that it place the application in condition for allowance or in better form for appeal. Entry of the foregoing amendment and consideration of the following remarks are respectfully requested.

Claim rejections under 35 U.S.C. §103

Claims 4, and 7-8 remain rejected under 35 U.S.C. §103(a) as being unpatentable over JP 2003-239040 to Mizutani, et al. (“JP ’040”) in view of JP 06-108152 to Kashima, et al. (“JP ’152”) for the reasons set forth on pages 2-4 of the Office Action.

In the Office Action, the Examiner contends that JP ’040 teaches a method of producing a hot-dip galvanized high strength steel with the same process steps (e.g., having the same heat pattern) as the present invention. The Examiner acknowledges that JP ’040 does not teach the claimed post-alloyed tempering step (e.g., holding at 200 to 500°C for 1 second to 5 minutes), but contends that JP ’152 teaches a similar method of producing a hot-dip-galvanized high strength steel, with a similar composition, comprises a tempering step, i.e., holding the sheet at 460°C for 5 seconds, during the final cooling step and that it would have been obvious to one of ordinary skill in the art to incorporate the tempering step of JP ’152 into the process of JP ’040 in order to obtain tempered martensite structure and improve the tensile strength of the steel sheet as taught by JP ’152.

JP ’040, however, does not teach or suggest the production process of the present invention. Applicants respectfully submit that JP ’040 teaches a different heat pattern from the claimed heat pattern. The heat pattern of JP ’040 is shown in **Figure B** below, consists of heating the steel to a temperature region of Ac1 to Ac3 + 100°C in the hot dip galvanization

step, holding the steel there for 30 seconds to 30 minutes, then cooling the steel at a cooling rate of 1°C/s or more to a temperature region of 600°C or less. In particular, JP '040 describes in paragraph [0016] that after performing annealing, the steel plate is cooled to 350°C, which means that JP '040 performs quenching in the middle of cooling after heating and soaking, prior to the hot dip galvanization and alloying steps. As a result, the martensite is tempered for a long time in the galvanization step and the alloying step. Following the production process and heat pattern of JP '040, the martensite structure of JP '040 is formed prior to hot-dip galvanization and alloying. Thus, the JP '040 process is clearly different from the claimed process.

Fig. A : The heat pattern of this invention

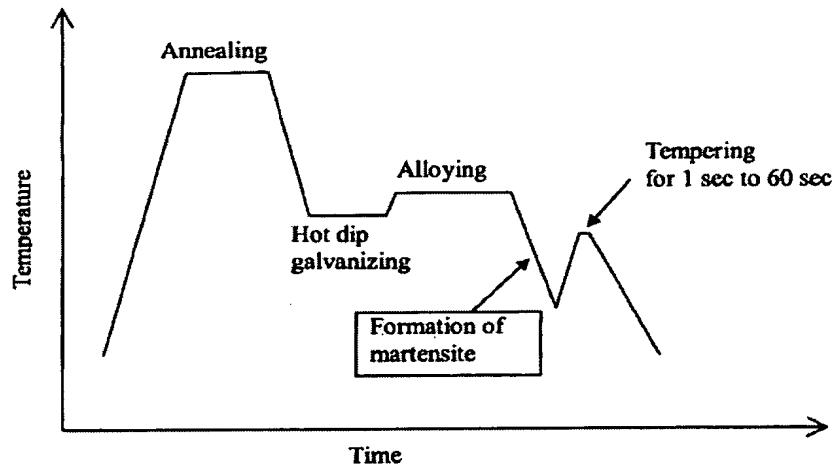
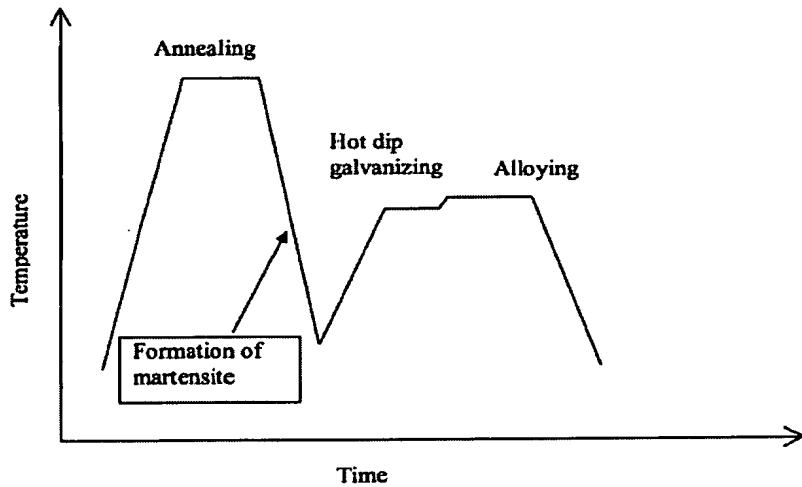


Fig. B : The heat pattern of JP'040



In contrast, the heat pattern of the present invention, as shown in **Figure A**, consists of quenching after the galvanization step and the alloying step, follow by reheating on a line connected with the continuous hot dip galvanization line, and tempering for a short time (e.g., holding at 200 to 500°C for 1 second to 5 minutes). According to the present invention, it is important that the quenching and reheating (tempering) steps are performed after the galvanizing step and the alloying step, to avoid over tempering. In this case, in the present invention, the desired tempered martensite is formed after the galvanization and alloying steps. Therefore, as shown by Figs. A and B, the heat pattern of JP '040 differs from the heat pattern of the present invention. In other words, the heat pattern of the present invention is not disclosed or suggested by the JP '040's disclosure. And, as the heat patterns are different, it would be improbable for one of ordinary skill in the art to obtain the desired tempered martensite of the present invention following the production process of JP '040.

JP '152 also does not teach or suggest the present production method or the heat pattern. According to JP '152, the cold rolled sheet was heat treated according to three different heat patterns. These specific heat patterns are described in paragraph [0032] of JP '152 and are shown in **Figure C** below. Based on heat patterns I to III of JP '152 (*see Fig. C*), hot dip galvanization and reheating (may also be for purpose of tempering and alloying) are performed after the quenching step which causes the martensite structure to form before the hot-dip galvanization and the alloying steps. Moreover, according to the heat patterns II and III, the heating process is produced by a batch process, the tempered martensite of the present invention on the other hand, is produced by a continuous process, e.g., connected to a continuous hot dip galvanization line, so the productivity of tempered martensite is improved. Thus, the heat patterns I to III of JP '152 differ from the heat pattern of the present invention.

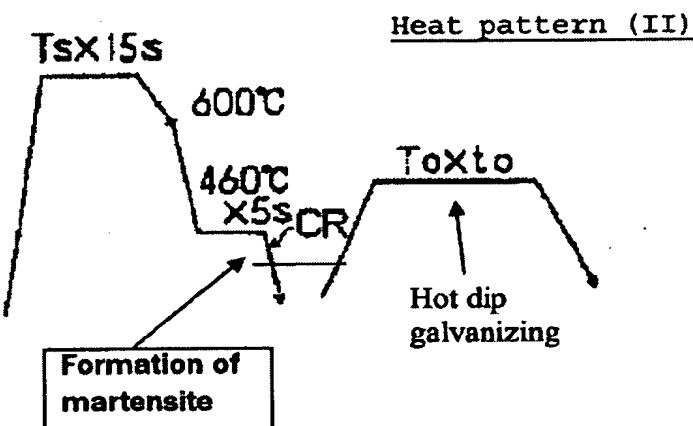
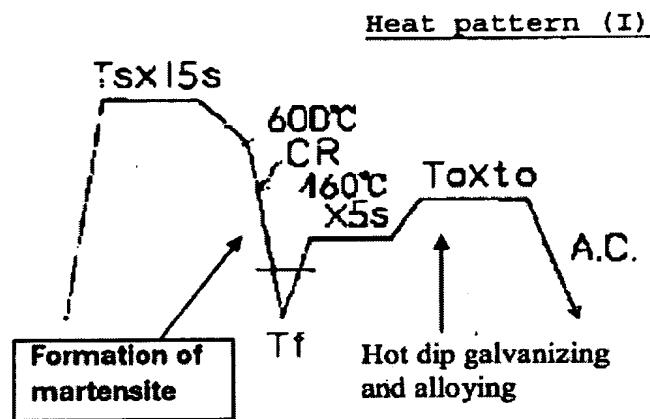
Furthermore, JP '152 teaches adding 0.01 to 0.10% of Al. According to JP '152, Al acts as a deoxidizing element and 0.01% or more of Al is required for this purpose, but if excess Al is added, the effect becomes saturated and poor plating is caused. Thus, Al is limited to between 0.01 to 0.10% (*see JP '152, paragraph [0013]*). Whereas in the present invention, Al is an element required for promoting the formation of ferrite and is effective in improving the ductility. Even if a large amount is added, it does not inhibit the hot dip galvanizing ability. Thus, the present claims recites 0.25 to 1.8% of Al (*see the specification, at p. 7, ll. 12-24*).

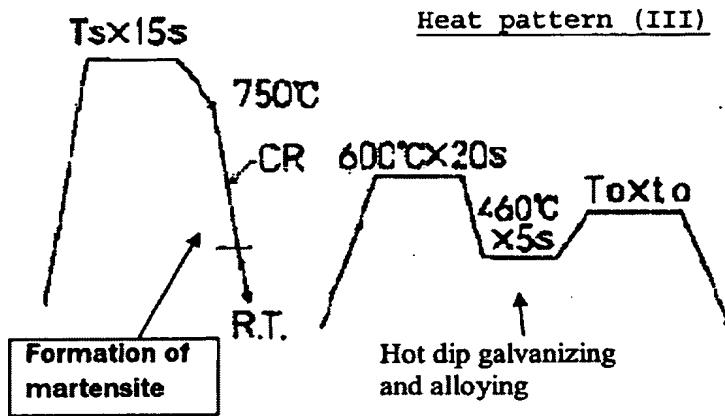
Therefore, JP '152 does not cure the deficiencies of JP '040. Even if one of ordinary skill in the art would to incorporate the tempering step of JP '152 into the process of JP '040

in order to obtain the tempered martensite structure and improve the tensile strength of the steel sheet as taught by JP '152, based on JP '040 or JP '152's heat patterns and JP '152's teachings, the desired tempered martensite of the present invention should not be obtained.

Thus, for at least the reasons presented above, JP '040 in view of JP '152 cannot render the presently claimed invention obvious. Applicants respectfully request withdrawal of the rejection of claims 4, and 7-8 under 35 U.S.C. §103(a) as obvious over JP '040 in view of JP '152.

Fig. C : The heat pattern of JP'152





Claim 6 remains rejected under 35 U.S.C. §103(a) as being unpatentable over JP '040 in view of JP '152 as applied to claim 4 above, and further in view of U.S. Patent No. 6,423,426 to Kobayashi, et al. ("US '426") for the reasons set forth on page 4 of the Office Action.

As discussed above, neither JP '040 nor JP '152, taken alone or in any combination, teaches or suggests the present production method or the heat pattern. In contrast to the presently claimed invention, US '426 teaches limiting the tempered martensite phase to 20% or more. According to US '426, if the amount of the tempered martensite is below 20%, remarkable effect of improving ductility cannot be expected (see, US '426, at col.6, ll. 20-29). However, the present invention teaches having 5 to 60% of tempered martensite.

Moreover, US '426 teaches adding 1.0 to 3.0% of Mn. According to US '426, Mn has the effect of strengthening steel by solid-solution hardening, improving hardenability of steel and promoting the production of retained austenite and low-temperature transformation phase. Such effects can be recognized if the Mn content is 1.0% or more (see US '426, col. 5, ll. 13-21). Whereas in the present invention, Mn is added in the amount of 0.1 to 3.3% for securing the strength and in addition delays the formation of carbides (see the specification, at p.6, ll. 26-35).

Thus, even if one of ordinary skill in the art would to incorporate the resin coating of US '426 into the process of JP '040, based on JP '040 or JP '152's heat patterns and US '426's teachings, the desired tempered martensite of the present invention should not be obtained. Therefore, US '426 does not supply what are missing in JP '040 and JP '152.

For at least the reasons presented above, one skilled in the art would not have combined the disclosures of JP '040 and JP '152 with the disclosure of US '426 to arrive at the presently claimed production method of a hot dip galvanized composite high strength steel sheet. Therefore, JP '040 in view of JP '152 as applied to the claim 4 above, and further in view of US '426 cannot render the presently claimed invention obvious. Withdrawal of the rejection of claim 6 under 35 U.S.C. §103 is respectfully requested.

Claims 9-10 remain rejected under 35 U.S.C. §103(a) as being unpatentable over JP '040 in view of JP '152 as applied to claim 4 above, and further in view of JP 05-331537 to Deguchi, et al. ("JP '537") for the reasons set forth on page 5 of the Office Action.

As discussed above, neither JP '040 nor JP '152, taken alone or in any combination, teaches or suggests the present production method or the heat pattern. In contrast to the presently claimed invention, JP '537 describes heating the sheet for 10 to 300 seconds in a temperature region of an Ac_1 - Ac_3 transformation point, and cooling the sheet to a temperature below an Ms (martensite transformation) point with an average cooling rate of not less than 2°C/sec. , before introducing into a hot-dip-zincing bath and alloying at $450\text{-}600^{\circ}\text{C}$ after hot dip zining (*see* paragraph [0006] of JP '537). On the contrary, in the present production method, the sheets are being cooled to a temperature of martensite transformation point or less after the alloying step to produce martensite.

Furthermore, JP '537 teaches adding 2 to 3.5% of Mn. According to JP '537, Mn has the effect of improving hardenability of steel and the minimum amount of Mn required in this case is 2% (*see* JP '537, paragraph [0010]). Whereas in the present invention, Mn is added in the amount of 0.1 to 3.3% for securing the strength and in addition delays the formation of carbides (*see* the specification, at p.6, ll. 26-35).

Thus, even if one of ordinary skill in the art would to incorporate the pre-plating step of JP '537 into the process of JP '040, based on JP '040 or JP '152's heat patterns and JP '537's teachings, the desired tempered martensite of the present invention should not be obtained. Therefore, JP '537 does not supply what are missing in JP '040 and JP '152.

For at least the reasons presented above, one skilled in the art would not have combined the disclosures of JP '040 and JP '152 with the disclosure of JP '537 to arrive at the presently claimed production method of a hot dip galvanized composite high strength steel sheet. Therefore, JP '040 in view of JP '152 as applied to the claim 4 above, and further

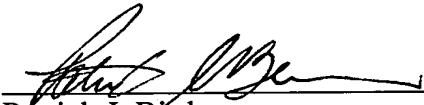
in view of JP '537 cannot render the presently claimed invention obvious. Withdrawal of the rejection of claims 9-10 under 35 U.S.C. §103 is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the present application is in condition for allowance. Early and favorable action by the Examiner is earnestly solicited. If the Examiner believes that issues may be resolved by a telephone interview, the Examiner is invited to telephone the undersigned at the number below.

Respectfully Submitted,

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By:


Patrick J. Birde
Reg. No. 29,770
KENYON & KENYON LLP
One Broadway
New York, New York 10004
Telephone: (212) 425-6452 (direct)
Fax: (212) 425-5288
CUSTOMER NO. 26646